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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/848,062	05/03/2001	Yong Yan	US 010121	5565

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EXAMINER

SIANGCHIN, KEVIN

ART UNIT	PAPER NUMBER
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2623

DATE MAILED: 05/06/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/848,062

Applicant(s)

YAN, YONG

Examiner

Kevin Siangchin

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____

Detailed Action

Drawings

Objections

1. The drawings are objected to because of the following. In Fig. 3, the Feature Extraction 12 should be labeled Feature Extraction Determinator 12, according to line 13-14 on page 6 of the Applicant's specification. Fig. 2 fails to comply with 37 CFR 1.84(p)(5) because it does not include the following reference sign mentioned in the description: video conferencing system 1 (line 17, page 5 of Applicant's specification). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

Objections

2. The disclosure is objected to because of the following informalities. On page 4, line 13, the Applicant states, "the steps of identify at least one object with in an image". To correct the grammatical error, this excerpt should read, "the steps of identifying at least on object within an image". On page 6, line 22, the Applicant refers to Fig. 100. Clearly, the Applicant intended to refer to Fig. 1. Correction should be made to reflect this. Appropriate correction is required.

3. The use of the trademark Microsoft Windows 95 has been noted in this application (page 8, line 16 of Applicant's specification). It should be capitalized wherever it appears and be accompanied by the generic terminology.

4. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

Claims

Objections

5. Claims 1, 8, and 14 are objected to because of the following informalities. These claims state, “identify at least one object *with in* an image”. Clearly, the emphasized portion of the preceding excerpt is a grammatical and/or typographical error and this portion of claims 1, 8, and 14 should read, “identify at least one object within an image”. Appropriate correction is required.

Rejections Under 35 U.S.C. § 102(b)

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 1-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Escher and Thalmann (“Automatic 3D Cloning and Real-Time Animation of the Human Face”, IEEE 1997).

8. *The following is in regard to Claim 1.* Escher and Thalmann disclose a technique for automatically modifying a generic 3-dimensional (3D) model of the human face, according to a facial image depicted in a sequence of images. The disclosed technique is directed primarily toward video conferencing or other virtual collaborative environments (i.e. model-based communication systems). See Abstract of Escher and Thalmann. This method comprises the steps of:

- (1.a.) Identify at least one object (i.e. various facial features defined by feature points) within an image (e.g. Escher and Thalmann page 59, right column, paragraph 1 and paragraph 2, sentence 2 and page 63, left column, paragraph 2, sentences 1-2).
- (1.b.) Extracting feature position information (e.g. feature points or characteristic points) of the object(s). See, for example, Escher and Thalmann page 59, right column, paragraph 2, sentence 2 and the section entitled *Characteristic Points*. It should be apparent that these feature points encompass position information (Escher and Thalmann page 59, right column, paragraph 2, sentences 4-6).
- (1.c.) Determining whether an adapted model is available based upon the extracted feature information. Refer to *Real time animation - Image/Video Driven* on page 63 of Escher and Thalmann and page 59, right column, paragraph 3. The determination as to whether an adapted model is obtainable (available) occurs during the feature extraction and tracking, upon the return of an array of MPA (minimal perceptible actions – Escher and Thalmann page 59, right column, paragraph 3). These MPAs are used to deform the generic model according to the depicted facial expression and, therefore, define the adapted model.
- (1.d.) If available, using the adapted model in the model-based communication system. This step follows from the discussion above relating to (1.c).

It has thus been shown that the method of Escher and Thalmann is a method for a model-based communication system comprises, at least, all elements claimed in Applicant's claim 1. Therefore, the teachings of Escher and Thalmann anticipate the method set forth in Applicant's claim 1.

9. *The following is in regard to Claim 2.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 1. As alluded to above, the method of Escher and Thalmann operates by deforming a generic model based on facial expressions (defined by the aforementioned array of MPAs) observed in an image or image sequence. Also refer to Escher and Thalmann page 63, left column, paragraphs 6-8, Figures 1-2, 4 and 7. In this way, the method of Escher and Thalmann further includes the step of acquiring a customized model related to the

object by modifying a generic model of the object. Therefore, the teachings of Escher and Thalmann anticipate the method set forth in Applicant's claim 2.

10. *The following is in regard to Claim 3.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 2. As mentioned above and in the Abstract of Escher and Thalmann, the models, adapted to the video (image sequence) input, are used in a model-based communication system. As would be apparent to one of ordinary skill in the art, computer modeling systems or 3D animation systems, such as that of Escher and Thalmann, typically store models (in RAM or disk) prior to display. Taking this into account, the method of Escher and Thalmann thus includes the step of using and storing the customized model in the model-based communication system. Therefore, the teachings of Escher and Thalmann anticipate the method set forth in Applicant's claim 3.

11. *The following is in regard to Claim 4.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 3. The method of Escher and Thalmann further comprise an initialization phase (step). See Escher and Thalmann page 59, right column, paragraph 2 and Figure 1 (in particular, the gray box labeled Face Initialization). The initialization phase involves initializing (essentially fitting the model and model texture to the corresponding properties of the image(s) of the face) the generic model. When the analysis of the video input (e.g. feature extraction and tracking) reveals the facial expression contained therein, the Face Animator uses the derived MPA array and the generic model to generate the customized model (Escher and Thalmann Figure. 1 and page 59, right column paragraph 3). The customized model thus becomes *available* and used in the animation (Escher and Thalmann Figure. 1). In this way, the said initialization phase and subsequent analysis and animation of Escher and Thalmann's method, collectively, provide a step in accordance with claim 4. Therefore, the teachings of Escher and Thalmann anticipate the method set forth in Applicant's claim 4.

12. *The following is in regard to Claim 5.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 1. As mentioned above, with regard to claim 1, Escher and Thalmann direct their teachings particularly toward model-based communication systems such as video conferencing or other virtual collaborative environments. See the Abstract of Escher and Thalmann. Therefore, the method of Escher and Thalmann conforms to the limitations set forth in Applicant's claim 5.

13. *The following is in regard to Claim 6.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 1. It should be clear that Escher and Thalmann's method deals strictly with human face

models. In this way, the method of Escher and Thalmann conforms to the limitations set forth in Applicant's claim 6.

14. *The following is in regard to Claim 7.* As shown above, Escher and Thalmann disclose a method that is in accordance with claim 1. It should be clear that Escher and Thalmann's method constructs 3D models of the human face. Therefore, the method of Escher and Thalmann conforms to the limitations set forth in Applicant's claim 6.

15. *The following is in regard to Claims 8-13.* These claims recite substantially the same limitations as claims 1-6, respectively. Therefore, with regard to claims 8-13, remarks analogous to those presented above with regard to claims 1-6 are, respectively, applicable.

16. *The following is in regard to Claims 14-20.* These claims recite substantially the same limitations as claims 1-7, respectively. Therefore, with regard to claims 14-20, remarks analogous to those presented above with regard to claims 1-7 are, respectively, applicable.

Citation of Relevant Prior Art

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

18. The methods, and the various embodiments of those methods, proposed by the Applicant in claims 1-20 generally belong to the field of Image-Based Modeling and/or Rendering. A wide range of literature was available at the time of the applicant's claimed invention that address most aspects of the Applicant's claimed subject matter.

[1] *Modeling and Rendering Architecture from Photographs, Ph.D. Thesis.* 1996. Paul Debevec

This paper is well-known and often cited in the field of image-based modeling. Debevec uses an image based approach to generating 3D models of architectural objects. Taken broadly, Debevec's teachings can be shown to address steps (1.a)-(1.d), discussed above relative to claim 1.

[2] *Analysis and Synthesis of Facial Image Sequences in Model-Based Image Coding.* IEEE

Transactions on Circuits and Systems for Video Technology, June 1994. Choi, et al.

Choi et al. disclose a method for analyzing sequences of facial images and, based on that analysis, synthesizing and modifying a 3-dimensional facial model corresponding to various facial expressions present in the facial images. This method is applied to face-to-face communication systems such as a video phone of teleconferencing system. In a manner similar to Escher and Thalmann, Choi et al. express facial expressions in terms of a “fixed” set of basis expressions called action units (AU). The teachings of Choi et al. can be shown to anticipate each element of the Applicant’s claimed subject matter. In particular, the method of Choi et al. addresses the limitations of claim 4. To find a vector in action unit (AU) space that defines a model that accurately represents the input facial image, Choi et al. iteratively evaluate the error between the model-based image (a projection of the 3D model onto the 2D plane of the input image) and the actual input facial image. In doing so, the generic model is *initialized* and, on each iteration, deformed by the derived AU vector *until* an accurate adapted/*customized*/deformed model is obtained (*is available*). This directly meets the limitations of claim 4.

- [3] *Face to Virtual Face*. IEEE, 1998. Thalmann, et al.

Thalmann et al. provide an overview of a more comprehensive and sophisticated system that encompasses the methods of Escher and Thalmann, discussed above.

- [4] *Modeling Facial Communication Between an Animator and a Synthetic Actor in Real Time*.

Proceedings of Modeling in Computer Graphics, 1993.

- [5] *SMILE: A Multilayered Facial Animation System*. IFIP, 1991.

- [6] *Simulation of Facial Muscle Actions Based on Rational Free Form Deformations*.

Eurographics 1992. Kalra, et al.

References [4]-[6] further elucidate the feature extraction and tracking and facial modeling of Escher and Thalmann. In particular, [5]-[6] provide a thorough dissertation of minimal perceptible actions (MPAs) and how they may be used in modeling expressions.

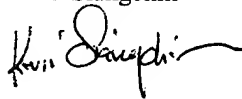
- [7] *Synthesizing Realistic Facial Expression From Photographs*. SIGGRAPH, 1998. Pighin, et al.
Pighin et al. disclose a method that can be shown to include steps (1.a)-(1.d) discussed above.
This reference is also relevant to claims 2, 4, and 6-7.
- [8] *International Patent Application Publication WO 98/01830: Image Processing*. January 1998.
Welsh, et al.
Welsh et al. disclose a method of coding an image of a face by deforming a generic shape
model and underlying muscle model by applying muscle parameters derived from the input
image. Welsh et al. use the method of coding in a video-conferencing application. Welsh et al.
address most of the Applicant's claimed subject matter.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Siangchin whose telephone number is (703)305-7569. The examiner can normally be reached on 9:00am - 5:30pm, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Kevin Siangchin



Examiner
Art Unit 2623

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